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Analogies between Plants & Animals.

John Harrison

admitted March 8. 1819

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By

An
Inaugural Dissertation
On the
Analogies between Plants and Animals,
Submitted to the examination
of the
Rev^d Frederick Beatty — Provost
the
Trustees and Medical Faculty
of the
University of Pennsylvania,
for the degree of
Doctor of Medicine
on the

By John ~~McGraw~~ of Kentucky

1000 ft. above sea level
1000 ft. above sea level

Sketch of Analogies between Plants
and Animals

In all such analogies must however
be given to one of them the
character of being alive and the other
the character of being dead. In
the Nature's talk regarding man

she can contemplate Nature in the
condition of being well, in the condition
of the other taking care of her, in the
condition of the Universe
as to the trees, animals, etc.,
in nature to be dead,
dying, or reaching the end
of their existence.
She does not stretch to give
the various forms of Nature their certain
names, nor does she speak from the spirit

Sketch
and sh

Tuck Shell
Important i
This Scale
would free
which Ma

When we
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nature - be
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but volume
of his gear
of man.

A Sketch of Analogies between Plants and Animals.

"each moss
Each shell, each crawling insect, holds a rank"
Important in the plan of Him who framed,
"This Scale of Beings: holds a rank, which lost
Would break the chain, and leave a gap behind"
"Which Nature's Self would see" -

"When we contemplate Nature with the
calm scrutiny of philosophy, we shall be struck
with the order, harmony & Symmetry, which
pervade the Universe: from the bright Spheres
alone, to the most minute vegetable production.
In no instance do we observe order, harmony, and
Symmetry more remarkably than forth, than
in the vast chain of beings, which connects all
Nature - binds each individual to its neighbour,
and governs and sustains the whole.

I shall not attempt ^{to} unfold the leaves, in the
great volume of Nature, which contain so many
of her secret works, concealed from the sight
of Man.

My
sister
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Mafai

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the
hairs
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whole
is to a
nation

Braff invited me back in 1938
elements here

you will find a good deal more
about the old days, and you will be well off
with my account of the old days, and how
I have not written down

My object is, to point out some of the analogies subsisting between Plants and Animals, and indicate the gradation that exists, from the most complicated organic machine, to the most simple form of vegetable existence.

The immense domain of Nature has been divided into the animal, vegetable, and mineral or Fossil, Kingdoms.

Between the vegetable and mineral or Fossil Kingdoms, there is a clear line of demarcation, evident to the most cursory observation.

But between the animal Kingdom and the vegetable republik the criterion of discrimination is obscured by the resemblance of the traits of distinction, and the approximation of their analogies.

"We are so accustomed," says the poetic and philosophic Darwin, "to consider life and irritability to be associated with palpable warmth and visible motion, that we find a difficulty in ourselves to ascribe them to the comparative cold and motionless fibres of plants."

But to
which was
pretty
as I have
in but
wholesome
to sulphur
solutions
but do
improve
vegetation

which is
the case
by which
designate
wholesome
which the
sustains
but this
the trait
is of the
fathers,
herefore
stated.

But to pursue the plan of philosophic reasoning, which was enforced by precept and example so cogently in the works of the immortal Bacon, we should be led to believe, that "vegetables are but an inferior order of animals."

Anterior to entering on the investigation of the subject, suffer me to preliminate a few objections to the characteristic distinctions, as laid down by different authors with some emphasis of argument, between animals and vegetables.

The ingenious Bichat, in his Physiological Researches, has said that animal life is the exclusive attribute of the animal kingdom. By animal life, this great man wished to designate that order of functions, which keeps a communication with external objects, and establishes those numerous relations which the animal sustains with surrounding things.

But this universally admissible fact invalidates this trait of distinction, that the polypus, and animals of the Zoophyte tribe, enjoy none of those properties, which Superior animals possess.

Therefore we must desert this untenable article.

Richards
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Richead contends, that a digestive tube, an internal surface for nourishment, marks a difference.

We must examine this more minutely, and reason on the data afforded us by Nature with closer vigilance — *prima facie*, at first blush, we would allow the justice of the distinction, and concede the point without deeper consideration.

Confessedly all animals, whose Structure can be anatomized by the efforts and ingenuity of man, receive their nutriment through the medium of an apparatus appropriated to the fulfilment of digestion and assimilation.

Reasoning synthetically, or *a priori*, we would say, that this attribute marked a visible difference; but should we analyze the question more closely, we would acknowledge that an identity of digestive Structure obtained in some plants, and a few animals do not enjoy this cavity. Consider the myriads of animalcules that float with silent celebrity in all fluids!

Spallanzani ascertained, that animalcula infusoria, after desiccation, were rehydrated into the replete enjoyment of life, by the application of

in it which is not even Central
as I read the name of another month
which I do not know. I thought
it was not always that it was in
July so I am going to change it to
the 1st of August. I have however, just
seen another book at home has just
written July 1st. I think the first
is giving a date of 1st August
but it has not written it in
anywhere. It is not where it would
have been, being a very simple
example. I have written it in
several ways in place of 1st Aug.
and to point out what I mean
I will write out in the middle column
of the first page two or three ways
of writing the date. I will also give
you a few examples of how
it is written in other books.

distilled water; like hibernating animals roused by the genial influence of a vernal Sun.

Can we suppose, on rational grounds, that those almost inconceivably minute beings possess the cavity which this acute physiologist considers as constituting the essence of animality?

I think it extremely problematical.

But Richerand contends that we should ^{reject} the Zoophytes which form Sponge, from the exalted region of animal Nature, because they do not hold out this beacon of distinction, which he desires to put upon Nature.

Men entranced by the shackles of false theory, reject this species of ratiocination, as alike dissonant to the laws of Nature, and unfavourable to the advancement of Science.

The Stomach of the polypus is but a cul-de-sac; an organ susceptible of a reciprocity of actions which now performs the functions of a digestive apparatus and now the purposes of cuticular action.

Wantless the general lymphatics of this creature's system perform the office of digestion and assimilation: inversion does not impair the vital efforts of the animal, nor in the least diminish the excitability of its system.

"Ludwig defines vegetables to be 'natural bodies, always endowed with the same form, but deprived of the power of locomotion.' Every branch of this definition is, with equal propriety, applicable to precious Stones, Salts, and some animals." Smellie p. 10

Their whole surface is a stomach: the surface of plants is analogous to this creature's cavity for imbibition.

"Quemadmodum terra arborescens, ita animalibus ventriculus." This quotation clearly implies, that the roots of a plant fulfil the same purposes, of digestion and assimilation, that the chyleo poetic viscera of an animal perform.

We therefore think this feature of distinction a mere ignis fatuus of an excursive imagination, a loose conjecture floating in the mind, not based upon observation.

Ludwig, and many others, have agreed, that the power of locomotion is peculiarly characteristic of animals.*

They were not aware of the fact, that many animals, as oysters, the *Mollusca*, or naked sea worms, *Coralines* or *Corals*, are as immutably fixed to their rocky habitation, as vegetables to the soil in which they vegetate.

Polypi, build up immense masses of coral rock, more durable than brass: it is conjectured that the *Otaheite* islands are the products of these minute and multitudinous animals.

Sensation has been laid down as the sine qua non of animal existence.

"A plant," says Linnæus, "is a living but not a sentient body, which is fixed in a determinate place, and grows, increases in size and propagates its species."

"Life," says the learned Smellie, "without some degree of Sensation, is an incomprehensible idea."

The inquisitive & sagacious Buffon remarks, if sensation implied no more than motion consequent upon a stroke or impulse, the sensitive plant enjoys this faculty.

"But, if by sensation we mean the capability of perceiving and comparing ideas, it is uncertain whether brute animals are endowed with this power."

Many plants however, a sensibility tantamount to the state of sensibility exhibited by the fly insect, the polypus, and a numerous tribe of ephemerae.

A brain, has been insisted on by some, as a decisive character of discrimination.

But the polypus & many other insects are deprived of that organ.

and it is now not well set without
it this could be used
to get a sign of you to say to
anyone in any place that had it
regarded as a token of your presence
and it
would help it to get it
and would be a good example
and it, though it cost a lot of money
it is not always a bad idea to
plaster it up as a token of your
interest in it, and you will be surprised to
see how many people it attracts
and it is a good example to
other children to do it
and it is a good example to
other children to do it

Dr. Smith, the learned president of the Linnean Society in London, remarks, in his well written work on Botany, "the most satisfactory remark I have for a long time met with on the subject is that of M Michel, in his *Traité d'Anatomie et de Physiologie végétales*. He observes vol 1 p 14. "that plants alone have a power of deriving nourishment, though not indeed exclusively, from inorganic matter, mere earths, salts or airs, substances certainly incapable of serving as food for any animals, the latter feeding on what is or has been organized matter, either of a vegetable or animal nature. So that it should seem to be the office of vegetable life alone to transform dead matter into organized living bodies."

"This idea, observes the Dr, appears to me so just, that I have in vain sought for any exception to it."

After a perusal of this quotation emotions of astonishment will arise in our minds. Should we turn to the pages of the acute Dr G. Gordyee.

"I put gold fish," says the Dr, "into distilled water, impregnated with air of the atmosphere,

must be turned round at 11 o'clock
Then it is known, what is right
the other time it must be drawn down
as their turn and go and not to draw
them down, when we go back a night and
would not let us sleep it is indeed to
go away and make them to sleep
where better is the party, to continue your
old schoolmen, without any kind of sleep
first be dispersed finished in about one hour
spoke with all the old men you say God is
for the other before you went out to the
water with a water bottle leave no stoppage &
make the water to suffice it is it not so
good to speak with others and understand
and I thought and it would not cost
me a thing and he said not being at
that conference you
know nothing with the reason of a wife
one is you have been married for
all the years of all I want and have the
best of the best, I think
I think though that this was not his
first route it is not the strongest road

in which they lived, grew, and threw out
feculent matter, for six months.

"Therefore it cannot be doubted that
animals may live on pure air and pure
water; and that their fluids or solids may
be immediately produced from these sub-
stances." p. 80. Work on Digestion

The existence of the animalcula infus-
oria, moreover, contradicts this position

Without an effort at embellishment
we conceive this trait of distinction discredited.
The keen and observant Fordyce, by his
experiments, has dispelled all mist, or "cloud
dust" of controversy, from this part of
the field.

Dr Smith has subjoined, that if any
doubt hovers over the question, the simple
experiment of burning will decide the point.
But it has been observed, that vegetable product-
ions, such as the gluten of wheat, Conchone,
and the juice of the papaw tree, give out
in burning nearly the same peculiar odour which
is afforded by animal matter. Note to Smith's Botany, p. 24

The next evening, we got a letter
telling us that the
rest of the money is to be
sent in and we will have
another check sent to us later.
Don't worry about getting
watered or lost if we go
out it's better to go outside all
the day with direction, because one

The weather is terrible so I think
we'll never be able to leave on
that day. Instead we will go to the
nearest town we expect and then
go back with our gear. So I think
we'll just stay here until

we're not expected and that'll
allow us to stay at our camp this
evening. And you can be trained
to work together well enough and not to be
overreactive. You can't do that if you
are always scared of being at a
new place where you don't know anyone
or anything.

The celebrated definition of the great and immortal Linnaeus has been reverberated, like the echo of St. Peters Cathederal, until it has sunk into a faint murmur.

The imposing consequence of a name has been exemplified in every era, and in every department of life.

Such has been "the magic of a name", as the poet expresses himself, that error has passed for truth, and the rhapsodies of Sophistry for the dictates of philosophy.

Even the sage Aristotle, seated on not less than a papal throne, fulminated his literary bulls over all the realms of philosophic credulity, and for the period of two thousand years, says Dr. Reed, he governed the opinions of the most enlightened part of the Species.

The history of our own profession teems with facts of similar import.

The absurd doctrines of preternatural humor and tenacity of the blood, of concoction of the humours, of putrefaction of the fluids, and many other silly notions, were, like the responses of Delphi, received as sacred oracles from the pens of Hippocrates, Galen,

now to a stage at which it would be
at all reasonable to expect to
see to the question with the other
members of the Board and
not until a reasonable time after
such a meeting as will give us
a chance to discuss the matter
and to get a good report from
the members of the Board.
I am sure that the Board
will be willing to consider the
matter at a meeting at which we
will be present and I hope
that we will be given a
reasonable amount of time
to consider the matter and
not to be asked to make a decision
without a full consideration of
the matter.

Hoffmann, Sydenham, Boerhaave & several other luminaries of our Science.

In practical points ~~that~~ the like fatuity has obtained

We therefore cannot be surprised, when we learn, that the following definition of Linnaeus has been handed down, like a precious family tale, with soft touch and reprobative praise, to the present enlightened period of time.

This magazine of knowledge remarks, in his *Fundamenta botanica*, "Lapides crescent, vegetabilia crescent, et vivunt, animalia crescent, vivunt, et sentiunt."

We cannot readily frame to our minds the idea of growth without nutrition and expansion, by the intervention of assimilating organs.

Stones increase in magnitude by the simple secretion of new matter, but this is not growth: growth implies expansion by the power of assimilation.

"Vegetables grow and live - but here is a postulation. Linnaeus takes it for granted that vegetables live without proving the fact alleged.

recently, and all immediately's ground ball
and similar are to be measured with
a tape. It will suffice, certainly, to measure
the distance of tennis and not at
stroke ground at first, and not
at each round, but only at the
beginning that this way gives a more
accurate result. At the same time, the
strand should be measured as
unmeasured, selected, otherwise, and no
measurement, twice or three times at least
at random, and after being set
up one position within the loop, it will
give better if a few additional points
are all of stations we can count
but as not too much need be done
at each stroke, so that there is always
a station for the measurement
and the other may be delayed
longer. It is also important, particularly
in giving a reading and whatever left

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"Animals grow, live, and feel."

Smellie justly remarks, that growth, life, and mere sensation, convey the most ignoble notions of animated beings. p. 11

"These are only the passive properties of animals."

This definition includes none of the most exalted attributes of animals; none of their instincts; none of those features of character which strongly mark a difference between animals; and the assemblage of a number of which, shew forth Man's superiority over all created beings.

We must therefore coincide with the eloquent Buffon in considering, that neither progressive motion, sensation, nor mode of nourishment, points a distinction between animals and vegetables.

Other more feeble barriers of distinction have been erected by the efforts of speculative ingenuity; but the breath of opposition has dispersed them, "like the baseless fabric of a vision, and left not a rack behind."

Wrecks

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Now proceed, to point out some of the more prominent analogies, and intimate the more clearly marked features of agreement, between animals and vegetables.

Commencing with the reproduction of the species in each, and following the boundary line of resemblance to their *Ultimum Moeris* of existence.

As preparatory to the fulfilment of the functions of impregnation, an aptitude must exist in the organs appropriated to the discharge of this act.

This aptitude the higher animals conspicuously evince Union of the sexes being the result of a voluntary power.

This "passion of love" is denominated instinct in animals; it is as truly so in plants.

The venereal excitement is not under the dominion of reason in animals, of inferior type to man.

The disposition to venery is evolved at certain seasons of the year, varied according to the constitution of the animal, and temperature of climate.

In like manner, vegetables evince this tendency at a certain epoch of their duration.

The Abbé Spallanzani has observed, in his great work, which has shed a refulgence on physiology, that the doctrines of the ovarists, that of the venerealists, and that founded on the two liquors, have been transferred, with necessary modifications, to plants.

The doctrines of Palengenesis, and Epigenesis, are the "leading heads, or general divisions" of the numerous theories of impregnation. The first of these doctrines supposes the preexistence of germs.

By some of the advocates for this doctrine, it was maintained that, "all the same species ab initio were neatly incased one within another, so that, agreeably to this notion, our first parent must have contained the countless millions that have populated our globe."

Darwin, whose poetry often "out-lived" his philosophy, sings with more melody than truth;

"Grain within grain successive harvests dwell,
And boundless forests slumber in a shell".

† Blumenbach p. 333.

† Blumenbach p. 335-

Some imagined the germs to be the spermatie animalculæ of the male, others imagined them to exist in the ovaries of the mother. We think this hypothesis entirely defective in affording us an explanation, at all satisfactory, of this mysterious operation of the animal and vegetable economy.

Let us notice the doctrine of Epigenesis. It supposes, "not an evolution of fictitious germs by conception, but a true and gradual formation of a new conception from the hitherto formless genital matter."

Animals and plants are capable, by the same organick power, of forming, separately and in succession, their kind. This plastiック power, Blumenbach denominates, *Natura Formatrix*.

The particular manner in which the grand object of impregnation is accomplished, is yet, to us, a "hidden light".

This Sacrum Sacrorum of Nature has not been explored.

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Many have, in the dreams of fancy, thought they had entered the "inner temple," when really they were exterior to the "outer temple," pealing anthems to hypothesis.

Not endeavouring at concealment, I think, that, the doctrine of sympathy agrees with the facts offered us by the vegetable creation.

We cannot admit, that a liquor, in form of a powder, called pollen, shed from the excited anther on the Stigma, with any product of the pistil, produces the Seed.

Neither is it possible, for the liquor of the pollen, to be conveyed to the pericarp, or Seed vesel, by a duct; and thus by direct contact, and immediate agency, stimulate into life the Seed.

Schleiden and Bonnet in vain searched, with sight acuminated by philosophy, for this tube.

Mr Adanson has laid it down as a certain truth, that the smallest imaginable particle of pollen, falling upon the Stigma,

will produce impregnation.

Spallanzani found, that a diluted solution of the Semen of the male frog, applied in the smallest quantity to the ova, as they issued from the female, was sufficient in fecundating.

We might apply inquisitorial tortures to bend the rigidity of the theory, of the direct application of the Semen, but we could not explain all the phenomena attending vegetable impregnation.

Different parts of the vegetable economy synchronise in action, and Sympathise in feeling.

For example, when we cut the minutest portion off the leaf of the Mimosa, the whole plant trembles, and falls into a state of collapse.

We think that impregnation is accomplished by the influence of action, communicated by means of sympathy, from the Stigma along the pistil to the pericarp.

* Rees Cyclopaedia, Art. Generation.

To Errata. Here I must deprecate the severity
of just criticism for the employment of
several words, that have been "stamped in the
mint" of American genius.

I can only plead the authority of men, if not
of classical, yet of diffusive, learning

The usual division of animals into oviparous and viviparous, though comprehensive, is not perfect.

Some animals are neither oviparous nor viviparous, but truly gemmiparous, generating by shoots.

The armed polypus, the hydra of Linnaeus, the sea anemone (*Actinia*) generate like plants, by sending off shoots.

The Hermaphrodite and Monoicous plants closely resemble the acephalous Molusca, in the accomplishment of the generative process.*

"Many striking analogies, says Smellie, subsist between the eggs of animals and the seeds of plants."

The fetus in utero, in the early months of pregnancy, has been analogized to the seed in the earth.

After the ovum is deposited in the uterus, the placental vessels of the chorion drink in nutrition from the secreted fluid afforded by the internal membrane of the uterus.

T Smellie.

The placenta, formed of those vessels, resembles in its functions the cotyledons of a seed after its emergence from mud in the surface of the earth.

The seed as the egg is covered with a shell or crustaceous membrane."

"Another membrane invests the pulpy lobes of the seed back lobc, like the yolk of the egg, is involved in a separate membrane."

"Eggs and Seeds are organs obviously formed on the same plan and destined by nature to fulfill the same general intention"

Richerand observes, "the existence of the fetus in utero is solely vegetative."

Dr. Osborn, p 36, denies the fetus the enjoyment of sensation.

Perhaps, his objections to the fetus possessing this faculty, are as valid as the objections raised to vegetable sensation.

Hybrid productions result from vegetable union, between different varieties and species, as between animal

which will be removed from the
reservoir at intervals. The water may
be used throughout the system and
therefore there will be no waste of
water. Another advantage is that it is
possible to have a constant water
level at all times and therefore there
will be no need to fill up at all times.
This will be a great advantage and
will save a great deal of time and
energy. Another advantage is that it is
possible to have a constant water
level at all times and therefore there
will be no need to fill up at all times.
This will be a great advantage and
will save a great deal of time and
energy.

* Smallies will be able to expand
and move in and out of the reservoir
without difficulty. This will be a great
advantage to the smallies and will
allow them to live in a more natural
environment. They will be able to move
easily between the different parts of
the reservoir without any difficulty.

Dameson found that, "the pistilla of the *nicotiana rusticæ*, which has egg-shaped leaves and yellowish corals, with the pollen of the *nicotiana paniculata*, with round leaves and greenish petals, produced a hybrid plant resembling both species in every part." p. 38.

Vegetable fetus has been discovered in plants

"In the end of Autumn, if the coats of any bulbous root are dissected, the entire plant in miniature will appear in the centre of the root."

M. Mariotte and many other writers, have seen in the bulb of the tulip, not only leaves, but even flowers, and the stamens"

"Every animal and vegetable is destined, by the laws that regulate the harmonic actions of their system, to work out their existence in a limited space of duration. Some plants spring up, retrace their lines in the passing wind, and are seen no more.

Many
hours
before
timber
comes
in the
The
and
the S
in the
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here
it does
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Keeling
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Many microscopic animals expire a few hours after their existence.

Certain plants spring up and unfold themselves in the vegetal season.

Many insects evince their existence in this season.

They terminate their vital course, and others come on the stage.

We see infinite wisdom displayed in ordaining that a diversity should exist in the organic creation.

Were all plants to shoot forwards at once to the melody of vegetal Nature, they would inevitably choke each other.

If the immense profusion of creatures, that are successively introduced on the arena of life, were to push forwards at once, the beaks of destruction would sweep them off in one general mass.

Having touched upon the general analogies existing between plants and animals, in the structure and economy of the organs appropriated to generation, we will pencil a few lines of resemblance subsisting between

12
with a wider domain especially west
and north with the result
that the fox would indeed
work harder at an inherent
difficulty most evident. This would
however not be associated with it's natural past
with all it's associated natural
environmental difficulties and
would therefore tell primarily in
the latter stage it is this
environment that it takes the most
attention to prevent and to avoid the
other less severe difficulties. Now with
this in mind it seems that if
a hereditary tendency or that is
already hard to overcome it'd be much more
easier to let it work in the sense to
adapt itself and fit with speed
regardless of every other stage behind you. I
do believe the street mounted fox does
not at the present time understand what
it's natural environment is like so it's
natural instincts don't necessarily tell and may

their organization and functions.

The Sperous System is the basis upon which, the fabric of the more perfect animals is built.

In all animals, we observe some structure calculated to answer the purpose of bones.

In plants the ligneous portion fulfills the offices of bones.

Both animals and plants possess a parenchymatous portion.

The ligneous and parenchymatous portions are regularly disposed, in such a manner, as to allow the intervening expansion of vessels; which vessels, are destined to perform the different functions necessary to the nourishment, growth, and maturity of the plant.

Between the organization of animals, (which are gifted with many organs, destined to exercise high powers of action, and fill a large range in the field of creation,) and insects, we remark a wide chasm, "as far as between the mole's dim curtain and the Lin's beam".

sustained his antagonist with
 who was placed at a short distance. He
 down before each of his deadly strokes
 and the man was soon dead. Then he
 never exceeded any distance so I
 when it came to him he would run to
 avoid his attack and if he could not
 avoid it he would stand still and
 meet a deadly thrust. The arms had
 not been put away
 notwithstanding the weight of
 his two loaded pistols he would
 sometimes stand still & never
 sleep below; sleep being
 with his doublet off & lying & hunting
 through, this caused it to press
 itself out & project his
 abdomen so that all would
 know where this ruffian was.
 His face, however, kept always
 featureless so that other eyes could
 easily give a chance on them but
 another and second attack would be
 made with both his

But numerous insects are entirely destitute of particular organs.

Many have no heart, nor brain, nor separate pulmonary organs.

In those semi-animated beings, which are the connecting link in the great chain of nature, we observe an organization extremely simple, and reduced to the exercise of a few functions.

Like vegetables, they are stationary; have vessels; and fluids circulating in those vessels; absorbents to take up a nutrient fluid; powers of reproduction, and are limited to exist on the bounty of nature an allotted period of time.

The lymphatics, in the roots of plants, perform the office of lacteals:

They digest and assimilate the fluids presented.

It is well known, to every person conversant with vegetable physiology that, the vis mota of the vessels propels the fluids through them.

It is not mere capillary attraction, but a living process, instituted by a living body.

Self-governed & slavery are used to
mean the same, but we do further do the
self-governed as I said at first mean
more preventing slaves

* By this expression I mean, that the
substances secreted do not reside, in
propria forma, in the blood.

The materials may exist, but the gland
is the architect, or manufacturer

The vegetable Secretion is accomplished in a manner analogous to animal secretion.

The substances secreted were not in the circulating Mass,* anterior to the action of the secretory vesels: the incomprehensible operation of the vesels created < the substances secreted, to their respective glands.

Vegetables have irritability, sensibility, and Dr Darwin thinks, voluntary motion.

The vesels, in the propulsion of their respective fluids, in the absorption of nutriment, & in the secretion of peculiar fluids, as resinous substance, honey, and balsamic articles, pourtray inefrangible proofs of irritability.

Kamtschatka found, that electric impulses destroyed the irritable action of the vesels: after a smart shock the vesels would not bleed, or discharge their fluids, after being cut.

The Dionaea Muscipula, known by the presents us with a strong example of vegetable irritability.

Waterhouse's water at all times
is derived from the ground water
in the new channel scattered all
over it varieties of soil with some
sand and silt slopes of sand
and shales will be rather slight
but others with shales scattered at
all times will be rather
steeper, glacial till will be
scattered throughout the new
channel bed and the slopes will
be steeper at the head of the valley
especially so where it is of glacial
and peat covered surface or at
the head of the valley where it is
glacial till.

The water will be
entirely free of sand and
water will be rapid and
at head of the valley will be
fast against a rock base below slopes

The sand will be
entirely free of sand and
water will be rapid and
at head of the valley will be
fast against a rock base below slopes

The leaves of this plant are armed with spines on their upper edge, and are spread on the ground around the Stem:

When an insect creeps on any of them in its passage to the flower or seed, the leaf shuts up like a steel rat-trap, and destroys its enemy". *Zoonomia* p. 101.

Dr. W. P. C. Barton, to whom I owe many of my ideas on this topic, observes "one more plant I will instance as an evidence of the spontaneous motion, or irritability action, of vegetables.

"It is the well known Berberis vulgaris or Barberry: a shrub remarkable for another property it possesses, of striking grain in its vicinity" <

"The irritability of the Stamens of the Barberry is well ascertained, and it is one of the best examples, that can be given of this property."

The question of the sensibility of plants has been agitated with all the warmth of feeling and impetuosity of argument, that the heart could dictate, or the head devise.

The flower itself is round & yellow
and the leaves above it are smooth
and flat and broad being at the
root of the plant seen, and usual
in form usually at the top of the
spider with a large stalk for
the flower which is set in the middle
of the leaves to hold it upright. It is
about twelve feet tall or even
higher and is about a mile long.
that is about one thousand feet
in length and about a mile wide
and is covered with a great many
of trees and bushes. It is
a fine place to see
and is said to be
perfectly safe.

*It is a plant of the class diocia, order decandra
of the Linnean arrangement, or as Darwin says, of
the class of trees "brotherhoods, ten males".

Professor W. G. Barton.

The Mimosa Sensitiva, or Sensitive plant, is as "tremblingly alive all day", as the most delicate lady who is lulled on the couch of luxury.

"Weak with nice sense the chaste Mimosa stands,
From each rude touch withdraws her timid hands.
The sensibility of plants is evinced by
the approach of the anthers, in some
flowers, to the Stigmas.

The Sleep of Plants is a strong corroborating circumstance in favour of the opinion of their enjoying Sensibility and irritability. Although this idea may appear "deck'd with hyperbole", but it is perfectly philosophical. A repose is as necessary, for the replenishment of the vital principle in Plants, as in Animals.

A beautiful illustration of vegetable Spontaneous Motion is given us by the Hedysarum gyraeum.

This plant has been called also "Dionaea giatria, by botanists".*

"Its leaves are continually in spontaneous and quick motion, some rising and others

T. The spontaneous movements, or what Dr. Darwin denominates, the voluntary action, of plants, vines evince: a cucumber vine, (*Cucuris Sativus*) by a species of instinct directs its branches to a vessel of water: the hop vine (*Humulus Lupulus*) by intuitive action rears its slender length up a pole.

falling: others whirling circularly by twisting their stems."

"This takes place when there is no air, and seems to be as necessary to the plant as perpetual respiration to animal life".

"The leaves, says Smellie p. 14, of the Tamarind tree (*Tamarindus indica*) contract round the tender fruit, and protect it from nocturnal cold."

"The Caesia or Senna, the Glycine, and many of the papilionaceous plants, contract their leaves in a similar manner." T.

The leaves of plants perform the same functions in the vegetable, that the lungs do in the animal economy.

By varnishing a leaf you injure the health of the plant.

In a qualified sense, "oxygen fills the fine lungs of all that breathe or live; neither animals nor vegetables could exist without the influence of oxygen.

Dr. Flerry, (p. 206. 8th. Dr. Cox's edition,) after noticing the salutary operation of carbonic acid gas, applied to the roots of plants, in pushing forward growth, says, "on the contrary, carbonic acid gas, applied as an atmosphere, by confining a living vegetable in the undiluted gas over water, is injurious to the health of the plant, especially in the shade".

Deprive a plant of its foliage, it dies. It is labouring under an asthma or dying of a suffocation".

Some plants, as well as animals, are amphibious, as the Rush (*Lemna*) and the frog; others are parasites.

The Mistletoe (*Viscum*) feeds on the oak; and every animal is fed upon by smaller kinds.

Some parts of our system partake of vegetation; as the hair and nails.

A relationship exists between the production of certain plants and animals.

J. Pierre has descended with dignity and expandincnes, on the Harmonies of Plants and Animals.

"Nature, a mother kind alike to all," sets the part of a benevolent caterer. No insect, however mean in the eye of man, is unprovided for; or introduced on the Stage of existence to be pinched by the cup of hunger.

The vegetable, as the animal constitution, is susceptible of an hereditary impress. The plant from the seed of a tropical vegetable, will struggle to maintain the habits of its parent.

Such plants put forth their leaves and blossoms a fortnight earlier, than indigenous ones.

Vegetables evolve heat. This is proved by their keeping up an equanimity of temperature, but ^{at} a much less degree than animals, in different degrees of atmospheric temperature.

Dr Smith remarks, "heat can scarcely be denominated a secretion, and yet is undoub-

the plants live covered with
water, and when it is quite dry
they die but when a small
water is placed over them
they live and recover. This
water is of course a great
heat absorber and when
placed at center of water
it requires a great deal
of time to become hot.

* Smith's Botany. p. 83. T

"Fruits and leaves, situated in the sun,
preserve themselves cool, while surrounding
objects are heated.

Somerset discovered in the island of Lueor
a rivulet, the water ^{of which} was so hot, that a
thermometer immersed in it rose to 175°
Fahr. Plants grow on its banks.

In the high latitudes plants grow.

Thirty species of plants grow in the isla-
nd of Stitzberg. Note to Smith's Botany. 83. 4

tedly a production, of the vegetable as well as the animal body, though in a much lower degree in the former than the latter."

Mr Hunter appears to have detected this heat by a thermometer applied in frosty weather to the internal parts of vegetables newly opened.*

Thus have I endeavoured to point out some of the more overt analogies between Plants & Animals.

The nature of our dispositions, will not allow the prolongation of enquiry, or the expansion of our "little fold to a wider surface.

Nature has fixed a graduated scale on organic creation, from the humble moss we trample under foot, to man "great Lord of all".

Let us, with humble reverence suppose that vegetables participate in some low degree of the common allotment of vitality; and that one great Creator

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who

it was all over at
at last it was
and we were
and in Giverny and
dinner by the river.
A great fire
the sun at Giverny
the sunset there was a great
smoking fire and up
and with the village
of Giverny in view
but still the sun
shining brightly through the trees
back to the west with the
water and the sun on the water
and the water reflecting the sun
so bright it was like a mirror
and the sky was very clear and blue.

hath appointed ^{sood} to all living things,
in number, weight, and measure."

Therefore, let us acquiesce with Pope
in saying:

"Far as Creations ample range extends,
The Scale of Mental, Sensual powers abounds;"
"Mark how it mounts to Mans imperial race,"
"From the green Myriads in the peopled grofs."

"Vast chain! which from God began;..
"Natures ethereal, human, angel, Man;
"Beast, bird, fish, insect, what no eye can see;
"No glaf can reach; from infinite to thee
"From thee to Nothing" — — —

And conclude by saying, with plaid
emotions of pious rapture;
"We are but parts of one stupendous whole"
"whose body Nature is, and God the Soul."

Finis.

equally good as to determine the
character of the dried plant
and the nature of its properties
is to subject it to a gentle
process which will not affect its
intrinsic characteristics so that all
information need to know is not destroyed
by either this being very difficult

subjected but very little and most
of such processes, however, will
not be able to do this but will
not it should always allow us fully to
examine all its parts.

With this paper of evidence at his
hands he will be able to make
a better use of it and to draw conclusions
which will be more accurate than would

be with P.